Communicating from the field with the Australian Army

By U.S. Navy Cmdr. Danelle Barrett

Scientists from the Australian Defense Science and Technology Office (DSTO), left to right, Thomas Cox, Chris Cocks and Philip Stimpson.

U.S. Pacific Command's Standing Joint Forces Headquarters (SJFHQ) participated in Exercise Vital Prospect with the Australian Defense Force (ADF) May 2-13 at the Greenbank training area in Queensland, Australia. This yearly event, conducted by the ADF, is an exercise for the Headquarters Joint Operations Command in Sydney to evaluate Headquarters 1st Division's performance as the land Deployable Joint Forces Headquarters (DJFHQ).

In existence since 1997, the DJFHQ's charter directs the DJFHQ to command a major joint task force. Specifically, its mission states: "On order, provide ready, deployable and sustainable land forces to conduct joint operations within Australia's Area of Interest in order to support Australian national interests."

The DJFHQ's most recent full operational deployment was in response to the 1999 East Timor crisis, when a cadre of more than 1,200 were sent to Dili, East Timor, for more than six months. Elements of the DJFHQ were also deployed for tsunami relief efforts in the region. DJFHQ's annual certification exercise keeps the staff prepared to respond to a variety of emergencies.

Communications personnel and equipment enable command and control of joint forces that are instrumental to successful DJFHQ mission accomplishment. Communications for the DJFHQ are provided by the First Joint Support Unit under the leadership of Australian Army Lt. Col. Shaun Love, who is also dual-hatted as the J6 (head of command, control, communications and computer systems) to the Headquarters 1st Division. Lt. Col. Love and his team managed all communications planning and execution during Vital Prospect, and were directly supported by the 101 Signal Squadron based in Brisbane.

Vital Prospect Technical Overview

During Vital Prospect, the fictitious country of Kamaria takes aggressive action in the region threatening its neighbors. Australia, backed by a United Nations resolution, steps in to diffuse the situation and return the region to status quo. The main objectives of the exercise included:

√ Form and operate a combined/joint task force headquarters in a deployed environment.
√ Test communications systems processes and procedures in a joint environment.
√ Test emerging technologies proposed by the Australian Defense Science and Technology Organization (DTSO) .

Architecture Overview

To meet these objectives, the DJFHQ and the 145-member 101 Signal Squadron deployed to the Greenbank training area and established the entire communications infrastructure within four days. The architecture included a mesh topology with almost 10 megabits of bandwidth received over 11 mobile satellite terminals transferred over terrestrial networks covering 29,795 meters of cable at the exercise location. The total bandwidth managed during Vital Prospect exceeded that of any previous DJFHQ exercise. Service provided by the 101 Signal Squadron was exceptional with connectivity reliability exceeding 99.9 percent.

The backbone of the deployed communications was the Battlefield Telecommunications Network (BTN), also known as "Project Parakeet." This system encompassed a range of satellite terminals, circuit and packet switching systems, asynchronous transfer mode switches, frame relay for data interface, and line-of-site radio relay equipment. The satellite terminals interfaced into two strategic sites terminating at Melbourne and Brisbane. Services were then connected from the BTN to the Defense Communications Network, the Australian strategic communications backbone.

Satellite connectivity is essential for the ADF, and much like U.S. Pacific Command's SJFHQ, the DJFHQ is dependent on satellite services for effective command and control. The communications architecture for Vital Prospect incorporated a robust voice, video and data network with connectivity via the Australian Defense Satellite Communications Capability. ADSCC comprises a combination of commercially purchased and leased satellite transponder capability across the X, Ku, Ka, C and L bands through several service providers including Singtel, Intelsat and Inmarsat.

The Defense Payload Segment, owned by the Australian government on Singtel's Optus C1 satellite, includes an X-band payload using four transponders with Earth, regional and spot beam coverage features, an X/Ka crossband capability, and a UHF Earth coverage

beam with six channels, one 25 kHz and five 5 kHz channels. This satellite provides a majority of the connectivity to deployed units in the Australasia area.

Optus B1 satellites provide Ku-band capability. However, the Ku spot beam covers only Australia and its surrounding waters, C and X-band must be used when forces move outside that spot beam. Inmarsat (L-band) and Intelsat (C-band) assets are leased on an as needed basis to augment bandwidth beyond what is available on Optus satellites.

Iridium (L-band) service is also leased for non-secure satellite phones for tactical deployers, and the DJFHQ has four Iridium handsets. X and Ku- bands are used primarily for critical command and control communications. The Ka-band is used for non-critical command and control support functions and systems like the ADF's Theater Broadcast System, which is similar to the U.S. Global Broadcast System.

The main control of the payloads and management of satellite apportionment is done at the Defense Payload and Operations Control Center at HMAS Harman, which is actually a naval station outside Canberra. The UHF satellite communications are controlled via the Naval Communications Area Master Station Australia.

The DJFHQ field headquarters was spread over a quarter mile area and consisted of approximately 40 temporary shelters that had to be wired for voice and data. The 101 Signal Squadron laid over 13,150 meters of copper cable and 16,645 meters of fiber optic cable within four days to ensure connectivity to all key players.

The Australian classified intranet, the Defense Secret Network (DSN) ran on a 100 percent multi-mode fiber backbone for compliance with Australian network security accreditation rules. The Defense Network Support Agency (DNSA) in Canberra sets configuration standards, and network security is a priority.

The DNSA has oversight of the activities on the tactical servers, routers and switches and can provide assistance remotely. This ensures a high degree of configuration control and enables rapid technical support to field units. The main applications on the DSN are Llama/Cheetah, a Windows-based program to display the common operational picture, and the Command and Control Personal Computer (C2PC), which is the same program used on U.S. military networks, Lotus Notes for e-mail, logs and databases, and Microsoft XP.

The Australian "For Official Use Only" network, the Defense Restricted Network (DRN), is similar to the U.S.'s NIPRNET. DRN runs a copper category five-cable backbone. The main applications on the DRN are Lotus Notes for unclassified e-mail and databases, Internet access and Microsoft XP. The local DJFHQ information manager determines who has permissions for access to e-mail and other applications/databases on the network. Communications planners for the Headquarters 1st Division are exploring options for Web-based solutions to improve data and information management.

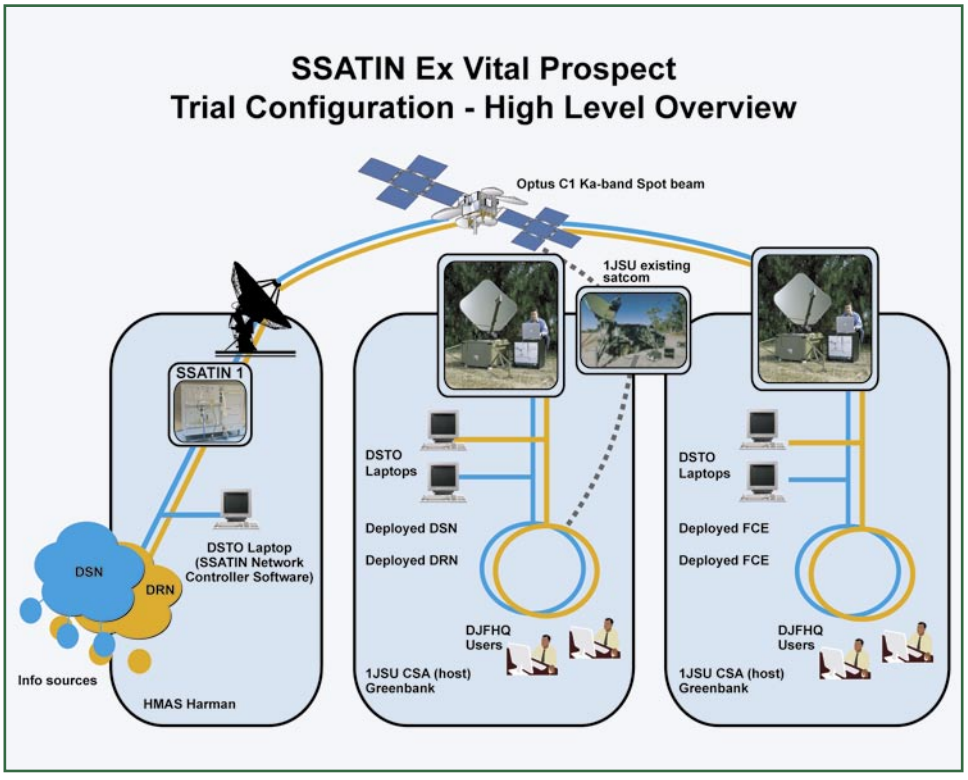
In addition to the BTN, other key services included a robust tactical voice system with 158 secure, digital voice data terminal adapter phones by British Aerospace Australia, 36 non-secure phones, and the Defense Integrated Secure Communications Network for record message traffic.

SSATIN

One of the exercise objectives was to test emerging technology for potential military application. To that end, the DSTO Information Network Division brought the Secure Satellite Internet Protocol Network (SSATIN) to test access on-demand and bandwidth-on-demand technology in a secure deployed environment. Specific goals of the SSATIN program as identified by the DSTO are:

√ Access-on-demand
√ Bandwidth-on-demand
√ Automated user terminal
√ Automated network control
√ Native support for IP traffic
√ Highly dynamic network control
√ Fully meshed network
√ Military-grade security architecture
√ Efficient use of satellite bandwidth

SSATIN (shown below) has many advantages over the traditional link-based architecture currently in use by the ADF. The legacy link-based architecture uses frequency division multiple access, which is not the most efficient way for several terminals to share the ag-



Members of the Australian Army 101 Signal Squadron during Exercise Vital Prospect were joined by U.S. Pacific Command's Standing Joint Forces Headquarters (SJFHQ) May 2-13 at the Greenbank training area in Queensland, Australia.

gregate available bandwidth, nor does it allow for prioritization or quality of services on data and voice transmissions of Internet Protocol (IP) traffic. SSATIN uses a time division multiple access method to allocate bandwidth more efficiently.

The bandwidth is shared between networks of different classifications and is dynamically reassigned based on individual node demand. Less active nodes have bandwidth reduced while more active nodes have it increased automatically. Both synchronous and asynchronous transmissions are supported, including such technologies as Voice over IP (VoIP) and IP multicast.

Two radio frequency satellite terminals were used for the SSATIN test at the exercise location with an aggregate 1 Mbps over Ka-band links. These terminals, using one-meter carbon fiber dishes, connected in a spot beam of the Optus C2 satellite.

The bandwidth for the entire network was controlled by administrators at a third SSATIN terminal located at HMAS Harman, while local administrators controlled bandwidth allocated for specific services within each node. A typical reallocation from the central controller took less than a second, including satellite latency. Although the current equipment for the system is not Joint Tactical Radio System compliant, the Australian military services are interested in pursuing use of JTRS in future engineering efforts to ensure interoperability with coalition partners.

The overall results of the test were extremely positive and the DSTO engineers intend to continue refining the systems for possible future deployment.

The Communications Management Group (CMG), a team of seven DJFHQ personnel working for the J6, managed communications oversight during the exercise centrally at Greenbank. Managed in similar fashion to U.S. Joint Communications Control Centers, the CMG provided 24-hour oversight of operational and strategic communications links.

Army Maj. Adam Dunn, a 10-year veteran of the Australian Signal Corps, led the group. Dunn recently finished a 24-month exchange tour with the U.S. Army at Fort Gordon, Ga., and the 11th Signal Brigade in Sierra Vista, Ariz.

"The exercise was a success because it gave the 1st Joint Support unit the opportunity to practice deploying a network that genuinely tested the unit's wideband capability. Being static once we deployed the network, we suffered very few outages, and as a result, we were able to provide a high level of quality communications and information systems support to exercise participants," Dunn said.

Declaring Success

The ability of the Australian Army to have a deployable and fully functional DJFHQ, capable of command and control of joint forces from anywhere in the Australasian area, is essential to its regional and national security strategy. By flexing its communications capabilities and testing emerging technologies during field exercises like Vital Prospect, the Australian Army is leading the way in demonstrating excellence in deployable command and control.

"In terms of technical control, the exercise gave the DJFHQ J6 Branch the opportunity to practice as a CMG for the first time this year. The CMG was able to manage a complex network that was the key enabler to HQ's ability to practice its operational procedures in a field environment. Overall, there's room for improvement, always is, but the exercise has been a success for the DJFHQ communicators," Dunn said.

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